REMARKS/ARGUMENTS

Status of the Claims

Claims 1-3, 5, and 6 remain in this application. Claim 1 has been amended to incorporate the feature of original claim 4 (and also original claims 7 and 8). Accordingly, claims 4, 7, and 8 have been canceled. In addition, Claim 5 has been amended to incorporate the method of claim 1. Applicant submits that support for the claim amendments can be found at least at, for example, page 6, lines 19 to 21, of the Specification as originally filed, and therefore no new matter has been added.

The Office Action

Claim 1 was rejected under 35 U.S.C. 103(b) as being anticipated by Streater (US 2003/0156651). Claims 2 and 3 were rejected under 35 U.S.C. 103(a) as being unpatentable over Streater in view of Wang (US 2003/0169816). Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Streater in view of Schwartz (US 5,717,394). Claims 7 and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Streater in view of Wang and Schwartz. Claims 5 and 6 were rejected under 35 U.S.C. 103(a) as being unpatentable over Streater (US 6,195,128 or Streater-B), in view of Streater and Lee (US 5,757,382).

The Claim Rejections

Claim 1, as amended, recites, among other things, a step of calculating distribution output data for the input data and generating variable length prefix codewords corresponding to the result in a manner which leaves logical codeword space available at the long end for new codewords for data of lower frequency when required.

The amendment to claim 1 clarifies the rather different approach to the utilization of codewords in the present invention, as compared to the prior art. In particular, conventional video encoding systems generally start with a standard "UVLC" table of codewords, which can be modified by moving the events in the UVLC table around, so that more popular outcomes are encoded with fewer bits and less popular outcomes are

encoded with more bits. This is generally referred to as "adaptive UVLC."

In a scheme of this kind the encoding process is started with a table, which is determined by an assumed probability distribution. Further, all of the codewords are themselves predetermined at the beginning of the process. That is to say, the "codeword table" is full, and the only subsequent changes that are made relate to rearrangement of the table.

Usually, this kind of system requires that the data is pre-recorded so that the coding scheme can be optimized for the whole of a video clip or sequence. However, the claimed method of compressing digital data is continuously adaptable and thus can be used to encode live video streams, not just pre-recorded video streams.

The method of claim 1 does not start with a predetermined set of codewords. On the contrary, the claimed method generates the codewords on a continuous basis depending on the current context. This process is described beginning at page 6, line 6, of the original specification, in the section entitled "Transitions with variable length codewords." At page 6, lines 11-16, the specification states:

> "On compression, the available context and codeword to compress are passed to the system. This then adds this information to its current distribution (which it is found performs well when it starts with no prejudice as to the likely relationship between the context and the output codeword). The distribution output data for this context is calculated and variable length codewords assigned to the outcomes which have arisen."

In other words, a series of codewords is generated on the basis of the existing "context," and they are recalculated, before all the "codeword space" is exhausted.

Applicant submits that neither Streater nor Schwartz discloses at least the aforementioned feature of independent claim 1, that is, calculating distribution output data for the input data and generating variable length prefix codewords corresponding to the result in a manner which leaves logical codeword space available at the long end for new codewords for data of lower frequency when required. In particular, it is submitted that secondary citation to Schwartz does not remedy the conceded deficiency in the primary citation to Streater. Accordingly, without conceding the propriety of the asserted combination, the asserted combination of Streater and Schwartz is likewise deficient, even in view of the knowledge of one of ordinary skill in the art.

The Office Action concedes that the primary citation to Streater does not disclose

that some codeword space is reserved at recalculation so as to allow successive new codewords to be assigned for data at lower frequency. (Office Action, page 4). Nonetheless, the Office Action rejected claim 4, contending that the secondary citation to Schwartz provides this necessary disclosure. (Office Action, page 5). This contention is respectfully traversed.

Schwartz relates to a method and apparatus for encoding and decoding data and notes that "when a codeword is started in the encoder, space is reserved in the appropriate buffer for the codeword in the order the codewords should be placed on the channel." (Schwartz, Col. 42, lines 59-65). Schwartz thus describes a situation in which "physical" space is reserved in a buffer. In claim 1 of the present application, however, the "codeword space" reserved at the long end for new codewords (for data of lower frequency when required) is not physical space in a buffer. Rather, it is "logical" space in the sense that the calculation of a new set of codewords is started before the maximum number of possible distinct codewords in the set has been allocated.

In other words, the process is somewhat analogous to generating a new "UVLC" table but without filling up all the available spaces in the table. By doing this, it is possible to optimize the efficiency of the process by keeping a record of the unused codeword space and the proportion of the total remaining codewords that the next data to encode takes. The shortest codeword, when the new codeword does not exceed its correct proportion of the available codeword space, is used. This is described in the original specification at page 7, lines 7 to 10.

Thus, the next codeword to be chosen depends on the amount of available codeword space, while maintaining the necessary characteristic of "prefix codes" and allowing spare space for new codewords as they are required to be generated.

In practical terms, a system of this kind may be employed in a programming environment such as JAVA, where memory management is typically unreliable. The specification, at page 7, lines 17-27, explains how the actual machine memory is allocated in such a way that when the codewords are to be recalculated a completely new allocation of memory is made. That is to say, the previous "codeword table" is completely discarded.

Thus, Schwartz does not provide a disclosure that remedies the aforementioned,

conceded deficiency in the primary citation to Streater.

As stated above, another amendment to claim 1 is in part (iii), which now refers to "recalculating the codewords from time to time in order to continuously update the codewords and their lengths." This amendment helps to clarify that there is not a particular period of time ("predetermined schedule") after which the codewords are all recalculated. As described in the specification on page 6, lines 19 to 21, the codewords may be recalculated for every new frame, or perhaps every time the number of codewords has doubled. In any case the effect is, once again, to ensure that the system always has sufficient space for new codewords to be added when required. It should also be borne in mind, as explained above, that the number of codewords is not preset as in the typical prior art examples.

In view of the foregoing, Applicant respectfully submits that independent claim 1 patentably defines the present invention over the citations of record. Further, the dependent claims should also be allowable for the same reasons as their respective base claims and further due to the additional features that they recite. Separate and individual consideration of the dependent claims is respectfully requested.

CONCLUSION

For at least the reasons detailed above, it is respectfully submitted all claims remaining in the application (Claims 1-3, 5, and 6) are now in condition for allowance. The foregoing comments do not require unnecessary additional search or examination.

☒ Remaining Claims, as delineated below:

(1) FOR	(2) CLAIMS REMAINING AFTER AMENDMENT LESS HIGHEST NUMBER PREVIOUSLY PAID FOR		(3) NUMBER EXTRA
TOTAL CLAIMS	**5**	**- 20 =**	**0**
INDEPENDENT CLAIMS	**1**	**- 3 =**	**0**

☒ This is an authorization under 37 CFR 1.136(a)(3) to treat any concurrent or future reply, requiring a petition for extension of time, as incorporating a petition for the appropriate extension of time. Applicants hereby petition the Commissioner under 37 C.F.R. § 1.136(a) and request a three month extension of time to respond to the outstanding Office Action.

☒ The Commissioner is hereby authorized to charge any filing or prosecution fees which may be required, under 37 CFR 1.16, 1.17, and 1.21 (but not 1.18), or to credit any overpayment, to Deposit Account Number 06-0308.

In the event the Examiner considers personal contact advantageous to the disposition of this case, he/she is hereby authorized to telephone the undersigned, at 216.363.9000.

Respectfully submitted,
Fay Sharpe LLP

19 Jan 2011
Date

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